United States Department of Agriculture

NRCS Natural Resources Conservation Service

Year 2004 Progress Report of Activities Los Lunas Plant Materials Center

Issued April 2005

1036 Miller Street SW, Los Lunas, NM 87031 Tel: (505) 865-4684, FAX (505) 865-5163, Web Site: http://www.plant-materials.nrcs.usda.gov

Who We Are

The Los Lunas Plant Materials Center (LLPMC) is one of 27 Plant Materials Centers operated by the USDA Natural Resources Conservation Service (NRCS). Areas served by the LLPMC include New Mexico, Northeast Arizona, Southeast Colorado, West Texas, and Southeast Utah. The LLPMC is located twenty-five miles south of Albuquerque in Los Lunas, New Mexico. It is operated in conjunction with New Mexico State University's Agricultural Science Center. The facility is located in the Middle Rio Grande Valley and includes 200+ acres of irrigated land.

Figure 1: Los Lunas Plant Materials Center at Los Lunas, NM

What We Do

It is our mission to develop, test and transfer effective, state-of-the-art plant science technology to meet customer and resource needs. The LLPMC targets these major land resource areas (ecozones):

- New Mexico and Arizona mountains
- San Juan River Valley plateaus and mesas
- Southern desert basin, plains and mountains
- Southern Rocky Mountains
- High intermountain valleys
- Pecos–Canadian plains and valleys
- Southern high plains

The LLPMC emphasizes using native plant materials to solve conservation problems. Environmental conditions including low precipitation, high intensity rainfall, wind, topography, and varied land uses combine to produce a variety of problems needing plant material solutions.

The LLPMC collects superior adapted plants for testing, selecting, and distributing to commercial growers along with seed and plant production technology. Additionally, plant establishment technologies are developed or refined that require minimal or no irrigation in the arid southwest. The following major objectives are addressed:

- Rangeland Erosion Control
- Cropland Erosion Control
- Water Quality Maintenance and Improvement
- Wildlife Habitat Improvement

The articles on the following pages provide a brief summary of Year 2004 accomplishments. For more detailed technical information, request the *Year 2004 Technical Report*.

Tall-pot Transplants Successfully Established Using Super-Absorbent Hydrogel

In the arid southwest, developing a successful transplanting system that required minimal follow-up irrigation was needed. This is especially true when considering plantings for landscaping highway medians and right-of-ways. Using shrubs that were started in tall-pot containers (containers measuring 24-inches or longer) and require minimal follow-up irrigation is essential for the success of revegetating these types of sites. The selection of tall-pot containers coupled with one or more follow-up applications of a super-absorbent hydrogel (sodium carboxymethyl cellulose) was tested at three separate locations in northern New Mexico: Milan, Santa Fe, and Eldorado Village. These three locations receive an annual average of only 10–14 inches of precipitation.

Researchers in the United States and Australia have documented the superior performance of containerized transplants that were grown in tall-pots and planted in

desert environments. Super-absorbent hydrogels have been used successfully in horticulture and agriculture as soil additives since 1965. These hydrogels have been shown to improve water holding capacity, improve aeration and drainage of soil mix, reduce irrigation frequency, and increase the shelf life of plants held in cold storage.

The Los Lunas Plant Materials Center (LLPMC) grew 16 native shrubs species in tall-pots made from 30-inch tall, 4-inch in diameter PVC DWV (drain, waste and vent) pipe. Seed from these 16 species was collected within a 200 mile radius of the three planting sites. Depending upon the species, it typically takes 3–4 years to produce a mature root ball from seed in this type of container. Plant species included: mountain mahogany, New Mexico privet, wavyleaf oak, threeleaf sumac, New Mexico locust, Woods' rose, fernbush, and Fremont barberry.

In the fall of 2000, a total of 96 shrubs were planted in Milan and 700 shrubs were planted in Santa Fe. In EldoradoVillage, a total of 3,000 shrubs were planted, 1,000 each fall beginning in the year 2000 and ending in 2002. During the planting process, each containerized plant was coupled with an embedded watering tube, 3 inches in diameter and 40 inches in length. For the first two years after planting, most of the plants were irrigated with 2 gallons of super-absorbent hydrogel applied through the embedded tube, and a small number of plants (30 or less per site) were irrigated only with water. These irrigation applications were done only once in the spring. Subsequently, the plants installed in the year 2000 have not received any supplemental irrigation since receiving hydrogel or water in the spring of 2001.

Figure 2: Filling embedded irrigation tubes with super-absorbent hydrogel at the NM Highway 285 roadside planting project in Eldorado Village.

The planting in Eldorado Village is located on a 6-mile stretch of the New Mexico State Highway 285 that bisects the Village. The local residents were very interested in this project and wanted to be involved from the beginning. We recruited 50 new NRCS Earth Team Volunteers who assisted in the selection of plant species and planting locations on the median and roadsides. They also assisted with the hand-planting of shrubs.

Figure 3: NRCS Earth Team Volunteers planting shrubs grown in tall-pots on the roadside of NM Highway 285 in Eldorado Village, fall of 2002.

During this 5-year evaluation period, the southwest has been in a drought cycle and only has received about 80 percent of its normal rainfall. However, at all three planting locations the survival rate is greater than 80 percent for those plants receiving the super-absorbent hydrogel. For those plants that received only water, the survival rate was less than 50 percent. The plants irrigated with the hydrogel mixture have shown a high survival rate in spite of the extreme drought conditions. As an example, some pinőn pines in native stands at the same locations are dead due to a lack of moisture. Using the tall-pot planting technology and limited hydrogel applications has become a proven technology in the arid southwest climate.

Figure 4: Woods' rose (red-brown shrubs on the left-hand side) and Apache plume (green shrub on the right-hand side) by the fifth growing season (summer 2004) on NM Highway 285, Eldorado Village.

Recently the Eldorado Village community has asked the New Mexico State Highway and Transportation Department to partner once again with the LLPMC on a new 7-mile portion of the old Las Vegas Highway located near their community. We have scheduled a community meeting in May 2005 to discuss the project.

These planting projects were completely funded by the New Mexico State Highway and Transportation Department.

Assistance–Conservation Concerns

The Los Lunas Plant Materials Center (LLPMC) has worked directly with NRCS Field Offices, Resource Conservation and Development Offices, and Soil and Water Conservation Districts to provide assistance with the following conservation concerns:

- Wind erosion
- Increased forage on rangeland

Solutions to the concerns have included field wind strips, variety trials, and revegetation techniques. Providing assistance allows the LLPMC opportunities to test new plant materials and demonstrate new planting techniques.

Wind Erosion

The LLPMC continues to provide giant sacaton transplants for trial plantings throughout the LLPMC service area. These trial plantings help to evaluate the effectiveness of giant sacaton as field and farmstead wind strip that aids in the prevention of wind erosion. The first of the trial wind strip plantings was established in 1999 in Columbus, New Mexico. Columbus is located approximately 2 miles north of the Mexican border, and the conditions are very hot, dry, and windy. Since then, several wind strip plantings have been established throughout the state, under many different growing conditions.

The wind strips provides two important benefits during the critical wind erosion period:

1. Establishes a barrier to protect against wind erosion.
2. Prevents soil particles from moving across the soil surface causing damage to young seedlings.

In 2004, the LLPMC established three new giant sacaton wind strip plantings in Clayton, Estancia and Isleta, New Mexico. These new plantings will allow the LLPMC to evaluate the adaptability of giant sacaton in various types of climatic zones.

Figure 5: Giant sacaton production field at the LLPMC

The LLPMC is evaluating Giant sacaton for expansion to other states in the LLPMC's service area, and also looks for other potential conservation uses for this species. The LLPMC hopes to release this species in the very near future.

Forage and Rangeland

This year the Espanola Field Office requested assistance for a landowner near Tres Piedras, New Mexico. Due to grazing elk, the land owner had been experiencing a loss of available forage on his ranch. The elk were eating the cool-season forage produced during the spring months, leaving very little forage for livestock during the summer grazing period. Because the ranch is located at a high elevation, the production of warm-season grass is very low. The warm-season grass species already established on the ranch (especially the blue grama) does not produce an adequate amount of forage for grazing purposes.

The Espanola Field Office became aware of blue grama being grown for seed production near Alamosa, Colorado. As a result, the field office requested a demonstration trial planting of blue grama varieties on the ranch. In July of 2004, four different varieties of blue grama were installed: Hachita, Alma, Lovington (LLPMC releases) and Bad River ecotype (released from the Bismarck Plant Materials Center in North Dakota). The Bad River ecotype originated from a blue grama collection made from the Bad River region of South Dakota.

The LLPMC will determine if developed varieties of blue grama can out-produce the existing native blue grama on the ranch. The 2004 seeding was completed at a fairly late date, and a new seeding will be installed early in 2005. The demonstration trial planting will be evaluated in 2005.

Figure 6: Planting blue grama in Tres Piedras

National Park Service Agreement

In 2004, the LLPMC had agreements with Carlsbad Caverns National Park, Capulin Volcano National Monument, Grand Canyon National Park, Hubbell Trading Post National Historic Site, Pipe Spring National Monument, and Zion National Park of the Department of the Interior's National Park Service (NPS). These agreements allow the LLPMC to assist the NPS to revegetate disturbed areas in the parks (such as roadsides, trails, campgrounds, and other construction areas. The LLPMC provides the NPS with plant materials of the parks' local native ecotypes, by producing both seed and containerized transplants for revegetation purposes.

During 2004, the LLPMC had seven native grass species in production on a total of 4 acres, and was able to produce 25 pounds of grass seed to be used for NPS revegetation efforts. In 2004, the LLPMC delivered 474 containerized transplants of 20 native species of shrubs and trees to the NPS.

The production of certain native species for the NPS can be a challenge to the LLPMC. Muttongrass, (*Poa fenderliana*) is a native cool-season grass that grows in the mesic ponderosa pine forest (above 7,000 feet) in the west. Grand Canyon National Park uses this species for its revegetation efforts, and the LLPMC is growing the necessary seed for this work. The LLPMC discovered that in order to produce optimum quantities of muttongrass seed at Los Lunas (which is located in a desert environment), higher inputs of both moisture and fertility were required. This higher input helps mimic the conditions found at the park and creates a moist environment for seed development and production.

Alkali Muhly Will Be Released In 2005

Species Good for Riparian Restoration, Offers Potential for Other Uses

Alkali muhly, sometimes called scratchgrass, (*Muhlenbergia asprtifolia*) will be released in 2005 by the Los Lunas Plant Materials Center (LLPMC) to commercial seed producers. The typical habitats for this species are damp meadows, moist riparian zones, and mesic (moderately moist) disturbed areas often with alkaline and saline soils. Alkali muhly is a perennial grass with elongated scaly rhizomes (under grown stems that spread from the original plant and initiate new plants) and an open, finely-branched seed head up to 18 inches tall. The seed used to develop this selected release was collected in a damp arroyo bottom near the Westwater Spring in San Juan County, New Mexico. Selection for agronomic production potential has resulted from several successive field plantings at the LLPMC.

The application of this species for riparian restoration on mesic sites with moderate salinity or alkalinity is a certainty. The LLPMC will be investigating the potential range of use of this species on more xeric and saline soils. The rhizomatous nature of this species as well as its tendency to thrive on shorelines of ditches and streams will make it very useful in bank stabilization. Because of its rapid spread, it could be planted as seedling stock at low density to rapidly colonize stream and ditch banks susceptible to erosion.

Several commercial seed producers have expressed interest in producing alkali muhly seed. Several land management agencies have also encouraged the development of this release, in particular the U.S. Department of Interior–Bureau of Reclamation who has partially funded this effort. Alkali muhly seed should be commercially available in 2008. Seed will be available from the LLPMC for field office evaluation plantings in 2006.

Riparian Restoration Interest Growing

Los Lunas Plant Materials Center Responds To Many Needs

NRCS's Los Lunas Plant Materials Center (LLPMC) provides equipment and help for Soil and Water Conservation District (SWCD) plantings. The LLPMC does about three planting per year in conjunction with SWCDs. These plantings provide district members and others "hands on" experience in planting and exposure to some useful tools making the plantings easy, and more importantly, successful.

As interest in riparian restoration continues to rise, so does demand for assistance from the LLPMC.

In Gallup, the District Conservationist Ed Oliver invited a biology class from Wingate High School to participate in a planting on Cottonwood Creek in Thoreau, New Mexico. The McKinley Soil and Water Conservation District would like to re-establish cottonwoods and willow on a 6.5 mile reach of this ephemeral stream. After district members experienced the ease of planting willows using an electric rotary hammer drill, they purchased one for future plantings.

In Belen, there were about 100 school children from Rio Grande Elementary School who were planting both cottonwood pole cuttings and understory shrubs where the Valencia Soil and Water Conservation District had cleared 10 acres of saltcedar and Russian olive. This project was funded by the State Forestry Division Relief Fund.

In Pueblo, Colorado, the LLPMC worked with the District Conservationist Rich Rhodes and his staff, and a local non-profit organization called "Concerned Parents" to plant 100 cottonwood pole cuttings and 200 tall-pot transplants on the Arkansas River. Pat Davey, the NRCS Plant Materials Specialist in Colorado, also participated.

In Pilar, the LLPMC worked with the Bureau of Land Management (BLM) to increases the density of willow on

the east bank of the Rio Grande near their public campsites. They previously had hand planted this area without much success. The electric rotary hammer drills were able to penetrate the gravel and cobbled banks getting the stems down 30-inches into the subsurface moisture.

In Farmington, the LLPMC staff planted 1,240 cottonwoods and black willow pole cuttings and 9,000 coyote willow pole cuttings. This project was funded by the Army Corps of Engineers Farmers Mutual Acequia Program. Their objective was to create wildlife habitat on a 30-acre BLM parcel on the San Juan River for mitigation of wildlife habitat that was destroyed by a new, underground conveyance system.

The LLPMC also provided 100 free plants including cottonwood and willow pole cuttings upon request to NRCS Field Offices for 19 Soil and Water Conservation Districts in 2004.

Future projects include four 50-acre demonstration plantings; two on the Rio Grande and two on the Rio Pecos. NRCS District Conservationists, State Wildlife Biologists, and the LLPMC will design and install these plantings using the latest technologies. Special federal funds have been allocated to support these projects to encourage other land owners and land managers to vegetate the more than 20,000 acres of riparian forest that has been treated in New Mexico to control saltcedar, Russian olive, and Siberian elm.

Giant Sacaton Pressed Into Service

NRCS Plant Materials Center Partners in Wind Erosion Project

The Grants NRCS Field Office and NRCS's Los Lunas Plant Materials Center (LLPMC) are partnering with the City of Milan, New Mexico to help initial efforts to vegetate a problem area along Interstate 40. Abandoned farmland, which was once part of one of the biggest carrot farms in New Mexico, is the primary problem area. The property is adjacent to the Interstate and has loose soil and very little vegetation.

The initial plans are to establish a staggered, three-row, mile long wind strip of giant sacaton. The plants will be spaced on 10-foot centers and will be irrigated and fertilized to obtain maximum plant height of over 10 feet within three years.

Giant sacaton is a native plant found in the many counties of New Mexico. It normally grows in arroyos and reaches a height of six feet. The LLPMC began working with giant sacaton in 1984. They have selectively propagated the native giant sacaton, and in doing so, they are now producing plants that grow up to 10 feet.

The giant sacaton wind strip will be planted in July 2005 by Milan city workers who will also install a sub-irrigation system. The LLPMC will grow the plants, and staff from the LLPMC will work with the city on the first day of planting. There are also plans to seed the field in question with native grass and forbs. NRCS has developed two native seed mixes which could be used, and provide the New Mexico Highway and Transportation Department with other economical seeding alternatives.

This project is state-funded and sponsored by State Senator Joseph A. Fidel of Cibola County.

Increasing Demand for Native Grass Seed

The surge in the demand for native grass seed continues in 2004, and as a result, places stress on the current supply of native grass seed available at the Los Lunas Plant Materials Center (LLPMC). This boom is being fueled by seeding areas that have been devastated by recent forest fires, disturbed by highway construction, invaded by exotic species, and affected by drought. In response to the ever-increasing demand, the LLPMC produces native seed for conservation projects throughout New Mexico and the surrounding high desert area.

The breeder stock the LLPMC maintains is most true to the type of the original grasses developed by the LLPMC. The breeder stock is used by the LLPMC to establish production fields, also known as foundation seed. The seed from the production fields is sold to commercial enterprises through the New Mexico Crop Improvement Association. Commercial growers use the foundation seed to establish their own productions fields, resulting in seed that can be sold to the public.

As a result of this chain of production, the LLPMC must maintain both breeders and foundation seed for each plant material variety. Maintaining breeder and foundation fields is labor intensive because the fields must be kept nearly weed free.

While the sudden upsurge is good news because it means more conservation and native grasses are being applied to the land, this same demand stresses the resources of the LLPMC. To respond to this demand, the LLPMC established new seed production fields in 2004 that included: ‘Vaughn’ sideoats, ‘Salado’ alkali sacaton, ‘Viva’ galleta, ‘Pastura’ little bluestem, and ‘Westwater’ alkali muhly.

Demands in the native seed industry tend to ebb and flow. Responding to these fluctuations appropriately is a significant task, and a challenge the LLPMC is ready to meet.

Figure 7: New seed production field of Alkali sacaton (*Sporobolus airoides*) producing 75 bulk lbs/acre the second year after planting.

Development of Plant Materials for Revegetation of Fine-Textured Saline Soils on Former Saltcedar Sites

The Los Lunas Plant Materials Center (LLPMC) received funding in 2004 to begin a plant materials development project for the US Fish and Wildlife Service through the Bosque del Apache National Wildlife Refuge. The goal of the project is to develop grass, forb, and shrub species adapted to fine-textured saline soils which are often found after saltcedar eradication activities in the southwest US.

A number of large saltcedar clearing projects are being performed under the auspices of several soil and water conservation districts in the New Mexico. Many cleared sites have deep alluvial water tables resulting from channel incision and flow management on the major rivers in the State (Rio Grande and Pecos). This deep ground water and lack of flooding potential imply that many of these sites are not appropriate for revegetation with riparian plants but must be revegetated with non-phreatophytic xeric species which can persist on fine-textured saline soils.

Although several appropriate species are presently commercially available including alkali sacaton (*Sporobolus airoides* 'Salado') and fourwing saltbush (*Atriplex canescens*), in particular the Vallis race, there is a need to develop commercial supplies of additional species to augment the species diversity of these sites. Several species currently under development at the LLPMC, giant sacaton (*Sporobolus wrightii*) and vine mesquite (*Panicum obtusum*), will probably prove appropriate for some of these former saltcedar sites, but their adaptation to salinity, aridity, and fine-textured soils will have to be further evaluated. Additional species which are presumed to have these adaptations will be identified, and seed collections will be made representing different populations.

Germination and growth under soil conditions typically present on former saltcedar sites will determine those species best adapted to these sites. These superior species or ecotypes will then begin the process of seed increase and cultivar release.

Distribution of Plant Materials in 2004

The 19 USDA-NRCS New Mexico Field Offices received plant materials as well as a number of federal, tribal, and municipal agencies. In addition, plant materials were distributed to commercial producers of native seed and plants. A high demand for riparian plants has developed as a result of the clearing of 20,000 acres of saltcedar on public and private lands in New Mexico in the last 5 years. Many of the plant materials distributed by the LLPMC have been used to revegetate these cleared riparian areas. Table 1 lists the plant materials distributed by the LLPMC in 2004.

Table 1: LLPMC 2004 Plant Distribution

Distributed to	Pole cuttings	Whip cuttings	Small cuttings	Bulk seed (lb)	Large containers 2 gal or greater	Medium containers 0.5 to 2 gal	Small containers less than 0.5 gal
Albuquerque Open Space	1,104				800		
Army Corps of Engineers	2,050	10,000		6	200	238	
Bureau of Land Management	55	200		1		60	196
Bureau of Reclamation	20	2500			130		
Hopi Tribe and Other Native Americans						269	442
Middle Rio Grande Conservancy District					972	280	
National Park Service				85		474	
NRCS NM Field Offices	900	450		1	45	745	2,588
Nursery Growers			5789			49	200
Other NRCS Offices				280			
Others	200	1,750		3		180	290
Seed Growers				246			
US Fish and Wildlife Service	100				324	729	190
US Forest Service					70	797	940
Valencia SWCD					77	536	
Total	**4,429**	**14,900**	**5,789**	**622**	**2,618**	**4,357**	**4,846**